GEOMETRY.

384. Proposed by S. LEFSEHETZ, Clark University.

Let ABC be a triangle, O a circle tangent to its three sides, T a variable tangent of O, which cuts the sides BC, CA, AB in a, b, c. Oa', Ob', Oc' the perpendiculars in O to Oa, Ob, Oc, cutting, respectively, T in points a', b', c'. Prove that Aa', Bb', Cc' meet in a point t, and find the locus of t when T varies. Purely geometrical proofs wanted.

385. Proposed by V. M. SPUNAR, M. and E. E., Chicago, Ill.

Given a triangle ABC, find the radius of a circle touching two of its sides and a line parallel to the third, at a distance $d=u+2r$.

386. Proposed by DANIEL KRETH, Oxford, Iowa.

Construct the triangle, having given, the vertical angle, the sum of the three sides, and the perpendicular.

CALCULUS.

308. Proposed by C. N. SCHMALL, New York City.

Prove, by calculus, that of all isoperimetric triangles, the equilateral has the greatest area.

309. Proposed by S. G. BARTON, Ph. D., Clarkson School of Technology.

In practical problems involving maxima and minima, it is really the greatest and least values of the function which are desired. Show why we can assume that the maximum is the greatest value and the minimum the least value under the conditions.

310. Proposed by C. N. SCHMALL, New York City.

Evaluate $\int_0^\pi \frac{dx}{1-2a\cos x+a^2}$. Edwards' *Integral Calculus for Beginners*, page 131, ex. 9, (iii). The answer given is $\frac{\pi}{1-a^2}$. Is this a complete answer to the question?

MECHANICS.

260. Proposed by W. J. GREENSTREET, M. A., Stroud, England.

To the ends of a fine inextensible string, length $2l$, are attached to equal, smooth, spherical, equally elastic (e) particles. At first the middle point of the string touches a rigid, fixed, circular rim, radius a, and the particles are $2l$ apart. They are now projected with equal velocities perpendicular to the string and curl around the rim. If l is greater than πa, find the condition that the particles will move after collision along tangents to the rim, the whole motion being on a smooth horizontal plane.

NUMBER THEORY AND DIOPHANTINE ANALYSIS.

183. Proposed by M. T. GOODRICH, Dixfield, Maine.

Show what relation must exist between the quantities A, B, and C, in the harmonic ratio $\frac{AB}{(A+B+C)(-C)}=-1$, so that they will be real positive integers.